

ABSTRACT OF THE DISCLOSURE

An apparatus and process for recovering elemental sulfur from a H_2S -containing waste gas stream are disclosed, along with a method of making a preferred catalyst for catalyzing the process. The apparatus preferably comprises a short contact time catalytic partial oxidation reactor, a cooling zone, and a sulfur condenser. According to a preferred embodiment of the process, a mixture of H_2S and O_2 contacts the catalyst very briefly (i.e, less than about 200 milliseconds). Some preferred catalyst devices comprise a reduced metal such as Pt, Rh, or Pt-Rh, and a lanthanide metal oxide, or a pre-carbided form of the metal. The preferred apparatus and process are capable of operating at superatmospheric pressure and improve the efficiency of converting H_2S to sulfur, which will reduce the cost and complexity of construction and operation of a sulfur recovery plant used for waste gas cleanup.